

991,043.

J. E. WARD.
PROCESS OF MAKING ROADWAYS.
APPLICATION FILED MAR. 14, 1910.

Patented May 2, 1911
2 SHEETS—SHEET 1.

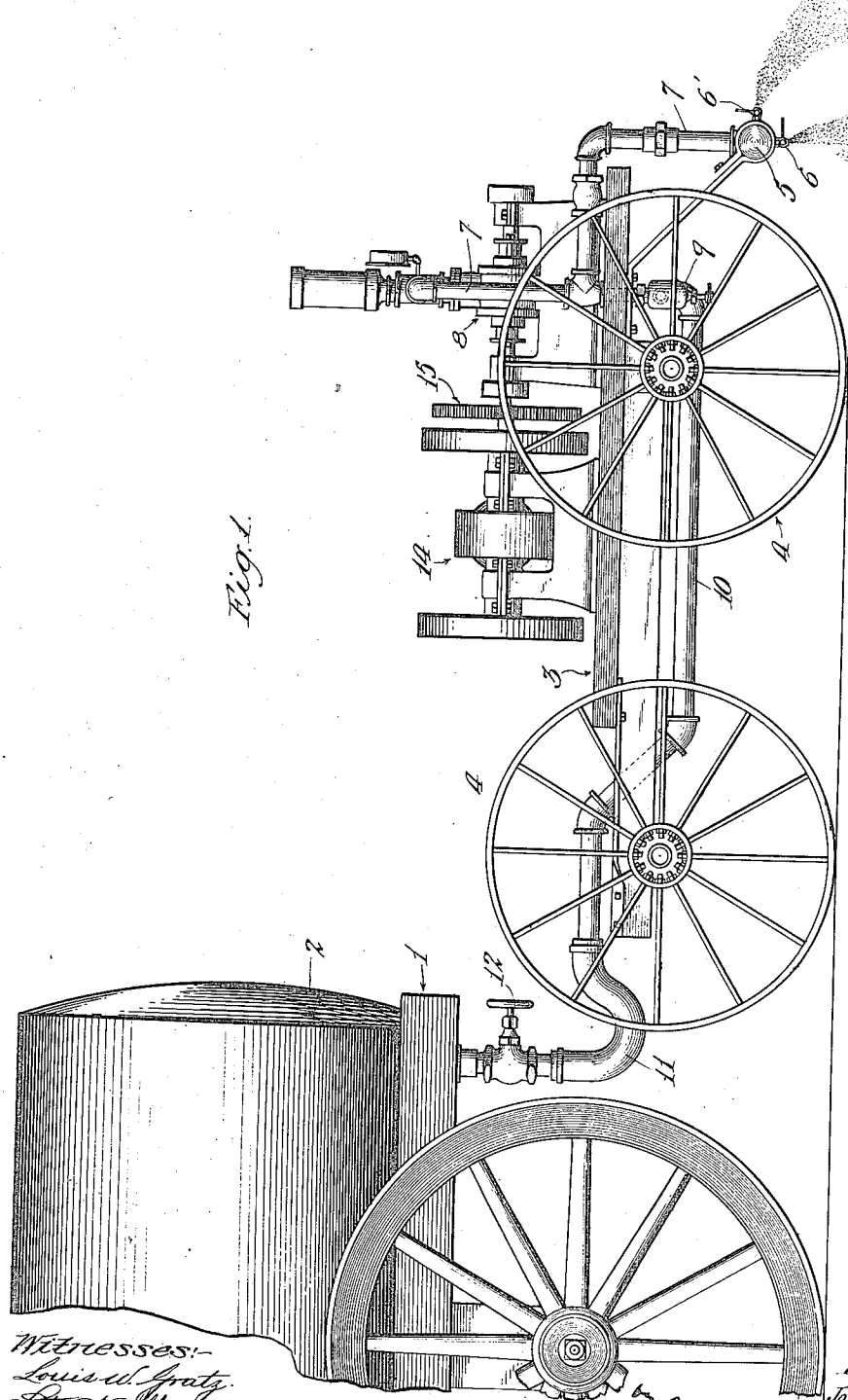


Fig. 1.

Witnesses:
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L. D. S. S. S.

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2 SHEETS—SHEET 2.

Fig. 2.

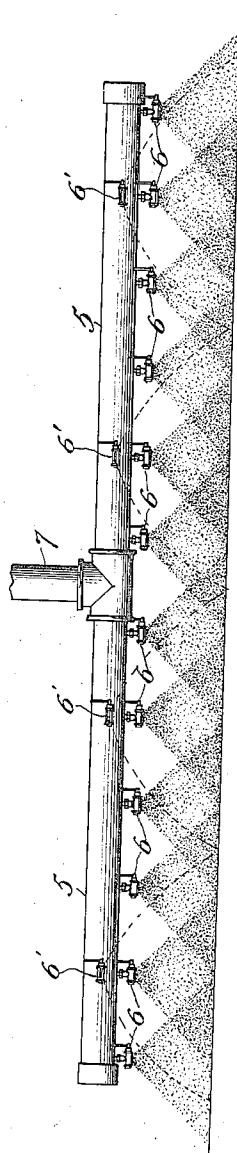
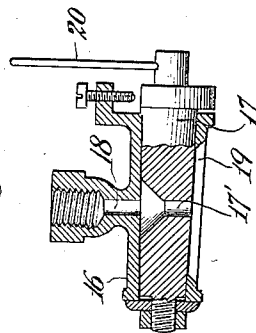


Fig. 3.



Witnesses:
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 L. D. Dyer.

Inventor
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UNITED STATES PATENT OFFICE.

JOSEPH E. WARD, OF LONGBEACH, CALIFORNIA.

PROCESS OF MAKING ROADWAYS.

991,043.

Specification of Letters Patent.

Patented May 2, 1911.

Application filed March 14, 1910. Serial No. 549,347.

To all whom it may concern:

Be it known that I, JOSEPH E. WARD, a citizen of the United States, residing at Longbeach, in the county of Los Angeles and State of California, have invented a new and useful Process of Making Roadways, of which the following is a specification.

The invention relates to a process for making roadways by application of oil to sand, gravel or earth forming a compact, dustless and waterproof mixture or combination.

The main object of the present invention is to reduce to a minimum the amount of oil required in making the roadway.

Another object of the invention is to enable the roadway to be made by application of oil thereto in a special manner without necessity of special mechanical treatment, such as stirring and rolling the ground after the application of the oil to finish the surface; the ordinary traffic being alone sufficient to compact and mix the oil with the solid matter of the roadway.

A further object of the invention is to provide for application of the oil to the roadway in such manner that there will be no objectionable deposit of liquid oil in pools or masses, such as would interfere with traffic.

Another object of the invention is to expedite the conversion of the oil to a solid condition by increasing the state of division thereof and thereby correspondingly increasing the rapidity of oxidation. In the formation of an oiled road the gradual oxidation of the oil by the action of the air is an important feature in the conversion of the road surface to a hard resistant condition and my invention provides for exposing the oil to the air in the most effective manner for such oxidation.

The process is specially applicable in connection with a roadway whereon there is a considerable deposit of dust, and in such a connection the process has the further advantage of immediately reducing the surface of the roadway to a dustless condition and of utilizing the dust as an important constituent in the road surface.

The process consists essentially in applying the oil to the road surface in a condition of suspension in the air in such manner that the oil as it settles into contact with the road surface permeates the road surface by reason of its fine state of division, forming a coating over each solid particle in the

road surface, so that in the stirring and compression of the road surface by the ordinary traffic these solid particles will be compacted together and will be caused to form a waterproof compact mass, the oil acting as a binder.

The accompanying drawings illustrate an apparatus suitable for carrying out the invention, and referring thereto:

Figure 1 is a side elevation of the apparatus. Fig. 2 is a rear elevation of the atomizing head or oil distributor. Fig. 3 is a longitudinal section of one of the atomizing nozzles.

1 designates an oil supply means consisting, for example, of an oil wagon carrying a tank 2, and 3 designates a truck connected to said oil wagon to be drawn thereby, said truck having running wheels 4 and carrying means for atomizing and distributing the oil.

The distributor means comprises a distributor head or pipe 5 extending transversely at the rear of the truck 3 and provided with a series of atomizing nozzles 6 at various points along the length thereof and with a supply pipe 7 leading to the outlet of a pump 8 whose inlet is connected to a pipe 10 connected by a flexible hose 11 and valve 12 in the oil tank 2. An engine or motor of any suitable character, indicated at 14, is connected by driving mechanism 15 to operate the pump 8. Each of the atomizing nozzles 6 may comprise a tubular casing 16, a plug 17 fitting therein and having a transverse port 17' communicating with an inlet opening 18 at one side of the casing and an outlet opening 19 at the other side of the casing. The delivery end of the port 17' is preferably flared and the outlet opening 19 is made sufficiently large to allow passage of the flaring blast of atomized oil from the nozzle. Handle means 20 are provided for each valve plug 17. An extra series of nozzles 6' may be provided at the rear of the distributing pipe for use in case an extra supply of oil is needed. A by-pass may be provided around the engine provided with a valve 9.

The process may be carried out as follows: The oil, which is preferably crude petroleum or residuum, of proper gravity and preferably with asphaltum base, is supplied in the tank 1 and being preferably subjected to a preliminary heating before being charged into said tank, so as to render the oil suffi-

ciently fluid for atomization. The oil tank and the truck being drawn over the surface of the roadway, the motor 14 is set in operation to drive the pump 8 and pump the oil 5 from the oil tank 1 and pipes 11 and 10, through the delivery or outlet pipe 7 and distributor pipe 5. The atomizing nozzles 6 are opened by their handle means 20 more or less to supply oil according to the condition of the roadway, the amount of dust 10 thereon, etc., so as to provide for a supply of oil commensurate with the absorbing capacity of the roadway, only so much being supplied as can be taken up by the dust and 15 the porous surface of the roadway as a superficial film on each solid particle or surface without the formation of pools or visible masses of oil. In case an extra supply of oil is needed, the valves 6' are opened distributing the oil as indicated in dotted lines 20 in Fig. 2, in addition to the distribution by the nozzles 6. The oil is forced by the pump 8 through the atomizing nozzles under sufficient pressure to insure atomization, and the 25 openings for the atomizing nozzles are sufficiently contracted to insure that as the oil issues under such pressure it will on encountering the air be broken up into such fine particles that it tends to remain suspended in the air for an appreciable length 30 of time forming a mist or mixture of air and minute particles of oil. This operation of finely dividing the oil to form a mixture with air is well understood under the term 35 "atomization" and the function of the operation in my process is to render the oil capable of permeation or diffusion into and between the solid particles and surface of the roadway, the mixture of air and atomized 40 oil having in this respect the properties of a gas as distinct from those of a liquid or solid.

Where oil is deposited on the roadway by means of the ordinary sprinkling nozzles or 45 by means of forcing the oil in a solid stream into violent contact with the surface of the roadway, the oil tends to collect in pools and has to be violently forced into the interstices of the roadway by mechanical action 50 for the reason that roadway surface dust particles, etc., have no capillary attraction for the oil but rather tend to repel the same until they have been actually wetted with it, but by reducing the oil to an atomized condition and suspending it in the air, it is 55 caused to enter the porous surface of the roadway and to penetrate between the dust particles by a process of diffusion; and when it is deposited upon such surface or particles, 60 it is in the final condition of distribution desired and does not require further mechanical stirring or pressure except to compact the particles together. As the oil supply and atomizing means pass over the surface of the 65 roadway, it, therefore, leaves on the roadway

a deposit of oil substantially covering each and every particle of dust and extending appreciably into the loose or porous dust on the surface of the roadway, the deposit being substantially uniform throughout and serving 70 at once to lay the dust and to give a binding surface for each particle, whereby it is adapted to serve as a constituent of the road surface in the subsequent traffic over the surface by wheeled vehicles, etc., the particles so coated or pressed together forming 75 a compact, dense, and substantially uniform waterproof road surface.

In the interval which elapses between the ejection of the oil from the nozzles and the 80 final compacting of the road surface by the traffic, the oil is maintained in a condition of maximum exposure to the air, thereby expediting the hardening or setting of the oil, both by reason of release of the more volatile 85 constituents and by oxidation.

When the oil is suspended in the air in atomized condition, it will part with the greater portion of its most volatile constituents and lessen the time of evaporation after 90 the oil is deposited on the particles of the road surface, it being deposited in an extremely thin layer or coating, each particle of the atomized oil being in fact deposited as a separate unit and maintaining its exposure 95 to the air until the particles are compacted together as stated. While the oil particles are thus exposed to the air and in contact with the dust and road particles, there is produced a gradual chemical action, 100 converting the oil to a more solid or harder form and binding or combining it with the solid elements of the road surface, this operation proceeding until the final compacting of the road as stated. 105

In practice the roadways treated by my process are free from all stickiness or slush and can be used by vehicles without any of the material adhering to the wheels, while pedestrians may walk upon or over the same 110 without the oil and road material becoming attached to their shoes, and being carried thereby onto sidewalks or into buildings, thereby effecting a large amount of damage to property situated adjacent to such roadways. 115

Heretofore roadways freshly treated with crude asphaltum base oil have generally been avoided by vehicles and pedestrians until the oil has been exposed to the action of the air 120 and sun for some considerable length of time and until such oil had lost the greater portion of the volatile oils therefrom by evaporation and oxidation, but by the use of my process a roadway may be used immediately 125 after the application of oil without danger of damaging any article.

What I claim:

1. The process of making a roadway which consists in atomizing oil in contact with air, 130

in such manner that the oil tends to remain suspended in the air for an appreciable time, bringing the atomized oil and air into contact with a porous road surface, causing the oil to permeate the porous road surface while still in atomized condition, and causing the atomized oil to be deposited on the material of the road surface while said material is agitated and partly suspended.

2. The process of making a roadway which consists in atomizing oil in contact with air, maintaining the oil in atomized condition and suspended in the air an appreciable time prior to bringing it into contact with a porous road surface, causing the deposit of at-

omized oil on the road surface in a thin layer of atomized oil particles, thereby maintaining the maximum surface of exposure of the oil to contact with the air and with the material of the roadway for hardening of the oil and binding the same to the road material by oxidation.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 5th day of March, 1910.

JOSEPH E. WARD.

In presence of—

ARTHUR P. KNIGHT,
FRANK L. A. GRAHAM.